adhesive resin layer is provided with a porous structure formed by the filler. Since the adhesive resin solution is held in the pores of the porous structure and thereby prevented from being absorbed by the electrode, the adhesive resin solution can be maintained on the adhered surface. Further, this effect brings about an increase in viscosity of the adhesive resin solution to further improve adhesive resin holding properties.

A1

Paragraph beginning at page 10, line 5:

A2

(Amended) The average particle size of the filler to be added is preferably not greater than that of the electrode active material, particularly 1 μm or smaller. Filler particles having an average particle size of greater than 1 μm form pores the diameter of which approximates the pore size of the electrode, and the ability of holding the electrolytic solution decreases. Where filler particles have an average particle size equal to or greater than the particle size of the electrode active material, the pores lose the ability of holding the electrolyte, resulting in reductions of battery characteristics. That is, the filler added produces no substantial effect. The sedimentation velocity of the filler particles in the adhesive resin solution increases with an increasing average particle size, which considerably deteriorates the handling properties of the adhesive resin solution. With the average particle size being 1 μm or smaller, the filler moderately increases the viscosity of the adhesive resin solution and makes the adhesive resin layer porous. The adhesive resin solution and the electrolytic solution can thus be held in the interface between electrodes.

Paragraph beginning at page 16, line 6:

A3

(Amended) A positive electrode active material layer consisting of 91 parts by weight of $LiCoO_2$ having an average particle size of 10 μm (produced by Nippon Chemical

Industrial Co., Ltd.), 6 parts by weight of graphite powder (produced by LONZA Ltd.), and 3 parts by weight of polyvinylidene fluoride (produced by Kureha Chemical Industry Co., Ltd.) was applied to an aluminum foil substrate to an average coating thickness of 80 μm to form a positive electrode. A negative electrode active material layer consisting of 90 parts by weight of mesophase microbeads (produced by Osaka Gas Co., Ltd.) having an average particle size of 8 μm and 10 parts by weight of polyvinylidene fluoride was applied to a copper substrate to an average coating thickness of 80 μm to form a negative electrode. An adhesive resin solution for joining these electrodes was prepared by dispersing and dissolving polyvinylidene fluoride (produced by Elf Atochem Japan) and alumina powder having an average particle size of 0.01 μm (produced by Degussa Corporation) in a concentration of 10 wt% each in N-methylpyrrolidone. The positive electrode and the negative electrode were cut in sizes of 50 mm x 50 mm and 55 mm x 55 mm, respectively. A cut piece of the negative electrode was coated with the adhesive resin solution on a screen printing machine using a 200 mesh screen and bonded to a cut piece of the positive electrode. The laminate was dried in a drier at 80°C for 1 hour to prepare a unit electrode body. The thickness of the formed adhesive resin layer was controllable by choice of the mesh size. In this example, the thickness was 20 μm.

Paragraph beginning at page 24, line 15:

(Amended) Electrodes were prepared, a battery was assembled, and evaluation was made in the same manner as in Example 1, except for using an adhesive resin solution prepared by dissolving and dispersing 10 wt% of polyvinylidene fluoride, 9 wt% of alumina powder having an average particle size of 0.01 μm, and 1 wt% of silica powder having an average particle size of 0.5 μm in N-methylpyrrolidone.

Paragraph beginning at page 25, line 6:

A5

(Amended) Electrodes were prepared, a battery was assembled, and evaluation was made in the same manner as in Example 1, except for using an adhesive resin solution prepared by dissolving and dispersing 10 wt% of polyvinylidene fluoride, 9 wt% of alumina powder having an average particle size of 0.01 μm, and 1 wt% of silicon carbide having an average particle size of 0.5 μm in N-methylpyrrolidone.

Paragraph beginning at page 31, line 23:

A6

(Amended) A positive electrode, a negative electrode, and an adhesive resin solution were prepared in the same manner as in Example 1. A band of 300 mm x 50 mm and of 305 mm x 55 mm was cut out of the positive electrode and the negative electrode, respectively. The adhesive resin solution was applied to a side of the positive electrode on a screen printing machine. One end of the coated positive electrode was folded back at a prescribed length. The negative electrode band was inserted into the center of the fold. Subsequently, the folded positive electrode and the negative electrode were superposed and passed through the laminator. The adhesive resin solution was applied to the other side of the positive electrode that was opposite to the side previously coated with the adhesive resin solution, and the laminate was rolled up into an oblong cylinder.

Paragraph beginning at page 36, line 13 from the bottom:

A7

(Amended) Table 3 shows the results obtained when the ratio of the alumina filler to the adhesive resin was varied. These results are graphed in Fig. 6, in which the peel strength and the battery capacity are plotted against volume percentage of the voids. The proportion of the adhesive resin in the void volume formed by the filler changes with a change of the

filler to resin ratio, and a change of the void volume in the adhesive resin layer follows. If the volume percentage of the voids is less than 20%, passages for ions through the adhesive resin layer are diminished, resulting in an obvious reduction in discharge capacity. On the other hand, the adhesive strength tends to reduce with an increase of volume percentage of the voids. If the volume percentage of the voids is more than 80%, the amount of the filler is so large that the amount of the adhesive resin is insufficient, resulting in an extreme reduction in adhesive strength.

A)

TABLE 1 (Amended)

	Adhesive				Peel strength (gf/cm)	Discharge Capacity (1C) (mAh)
	Resin	Filler	Weight Ratio	Particle Size of Filler (μm)		
Example 1	PVDF	alumina	1:1	0.01	50	60
Compara. Example 1	PVDF	none	-	-	100	20
Example 2	PVA	alumina	2:5	0.01	70	60
Compara. Example 2	PVA	none	-	-	100	30

TABLE 2 (Amended)

	Adhesive				Peel strength (gf/cm)	Discharge Capacity (1C) (mAh)
	Resin	Filler	Weight Ratio	Particle Size of Filler (μm)		
Example 1	PVDF	alumina	1:1	0.01	50	60
Example 3	PVDF	alumina	1:1	0.1	60	55
Example 4	PVDF	alumina	1:1	1	65	50
Example 5	PVDF	silica	1:1	0.007	45	60
Compara. Example 3	PVDF	alumina	1:1	10	60	25

TABLE 3 (Amended)

	Adhesive				Volume of Solid Matter (%)	Void Volume (%)	Peel Strength (gf/cm)	Discharge Capacity (1C) (mAh)
	Resin	Filler	Weight Ratio	Particle size of Filler (μm)				
Example 1	PVDF	alumina	1:1	0.01	50	50	70	62
Example 6	PVDF	alumina	2:1	0.01	70	30	85	58
Example 7	PVDF	alumina	1:5	0.01	30	70	60	65
Compara. Example 4	PVDF	alumina	10:1	0.01	90	10	100	20
Compara. Example 5	PVDF	alumina	1:10	0.01	10	90	20	65

TABLE 4 (Amended)

	Adhesive				Thickness (μm)	Peel Strength (gf/cm)	Discharge Capacity (1C) (mAh)
	Resin	Filler	Weight Ratio	Particle size of Filler (μm)			
Example 1	PVDF	alumina	1:1	0.01	20	70	60
Example 8	PVDF	alumina	1:1	0.01	50	70	58
Example 9	PVDF	alumina	1:1	0.01	100	70	55
Example 10	PVDF	alumina	1:1	0.01	150	70	50
Example 11	PVDF	alumina	1:1	0.01	10	60	60
Example 12	PVDF	alumina	1:1	0.01	200	70	30

TABLE 5 (Amended)

	Adhesive				Peel Strength (gf/cm)	Discharge Capacity (1C) (mAh)
	Resin	Filler	Weight Ratio	Particle Size of Filler (μm)		
Example 1	PVDF	alumina	1:1	0.01	50	60
Example 13	PVDF	silica	1:1	0.01	50	60
Example 14	PVDF	silicon carbide	1:3	0.5	80	50
Example 15	PVDF	boron carbide	1:3	0.5	80	50
Example 16	PVDF	silicon nitride	1:3	0.5	80	50
Example 17	PVDF	PMMA	2:1	0.5	80	50

TABLE 6 (Amended)

	Adhesive								Peel Strength (gf/cm)	Discharge Capacity (1C) (mAh)
	Resin		Filler 1			Filler 2				
	Kind	Weight Ratio	Kind	Weight Ratio	Particle Size of Filler (μm)	Kind	Weight Ratio	Particle Size of Filler (μm)		
Example 1	PVDF	1	alumina	1	0.01	none	0	0	50	60
Example 18	PVDF	1	alumina	0.9	0.01	alumina	0.1	1	55	55
Example 19	PVDF	1	alumina	0.5	0.01	silica	0.5	0.01	50	60
Example 20	PVDF	1	alumina	0.9	0.01	silica	0.1	0.5	55	55
Example 21	PVDF	1	alumina	0.9	0.01	PMMA	0.1	0.5	55	55
Example 22	PVDF	1	alumina	0.9	0.01	silicon carbide	0.1	0.5	55	55
Example 23	PVDF	1	silicon carbide	0.5	0.5	PMMA	0.5	0.5	80	55

Table 7 (Amended)

	Adhesive										Peel Strength (gf/cm)	Discharge Capacity (1C) (mAh)
	Adhesive Resin Layer (Intermediate Layer)					Adhesive Resin Layer (Electrode Surface Layer)						
	Adhesive Resin		Filler			Adhesive Resin		Filler				
	Kind	Weight Ratio	Kind	Weight Ratio	Particle Size of Filler (μm)	Kind	Weight Ratio	Kind	Weight Ratio	Particle Size of Filler (μm)		
Example 1	PVDF	1	alumina	1	0.01	none	-	-	-	-	50	60
Example 24	PVDF	1	alumina	1	0.01	PVDF	1	iron	2	0.5	55	50
Example 25	PVDF	1	alumina	1	0.01	PVDF	1	carbon	5	1	55	50
Example 26	PVDF	1	silicon carbide	3	0.5	PVDF	1	iron	2	1	80	45
Example 27	PVDF	1	silicon carbide	3	0.5	PVDF	1	carbon	5	1	80	45
Example 28	PVDF	1	PMMA	0.5	0.5	PVDF	1	iron	2	1	80	45
Example 29	PVDF	1	PMMA	0.5	0.5	PVDF	1	carbon	5	1	80	45

Table 8 (Amended)

	Adhesive				Battery Structure	Discharge Capacity (1C) (mAh)
	Resin	Filler	Weight Ratio	Particle Size of Filler (μm)		
Example 1	PVDF	alumina	1:1	0.01	tabular unit electrode body	60
Example 30	PVDF	alumina	1:1	0.01	tabular laminated electrode body	360
Example 31	PVDF	alumina	1:1	0.01	"	360
Example 32	PVDF	alumina	1:1	0.01	tabular rolled electrode body	360
Example 33	PVDF	alumina	1:1	0.01	"	360

Table 9 (Amended)

	Adhesive				Battery Structure	Discharge Capacity (1C) (mAh)
	Resin	Filler	Weight Ratio	Particle Size of Filler (μm)		
Example 1	PVDF	alumina	1:1	0.01	screen printing	60
Example 34	PVDF	alumina	1:1	0.01	roll coater	60
Example 35	PVDF	alumina	1:1	0.01	gravure printing	60
Example 36	PVDF	alumina	1:1	0.01	doctor blade	60
Example 37	PVDF	alumina	1:1	0.01	bar coater	60